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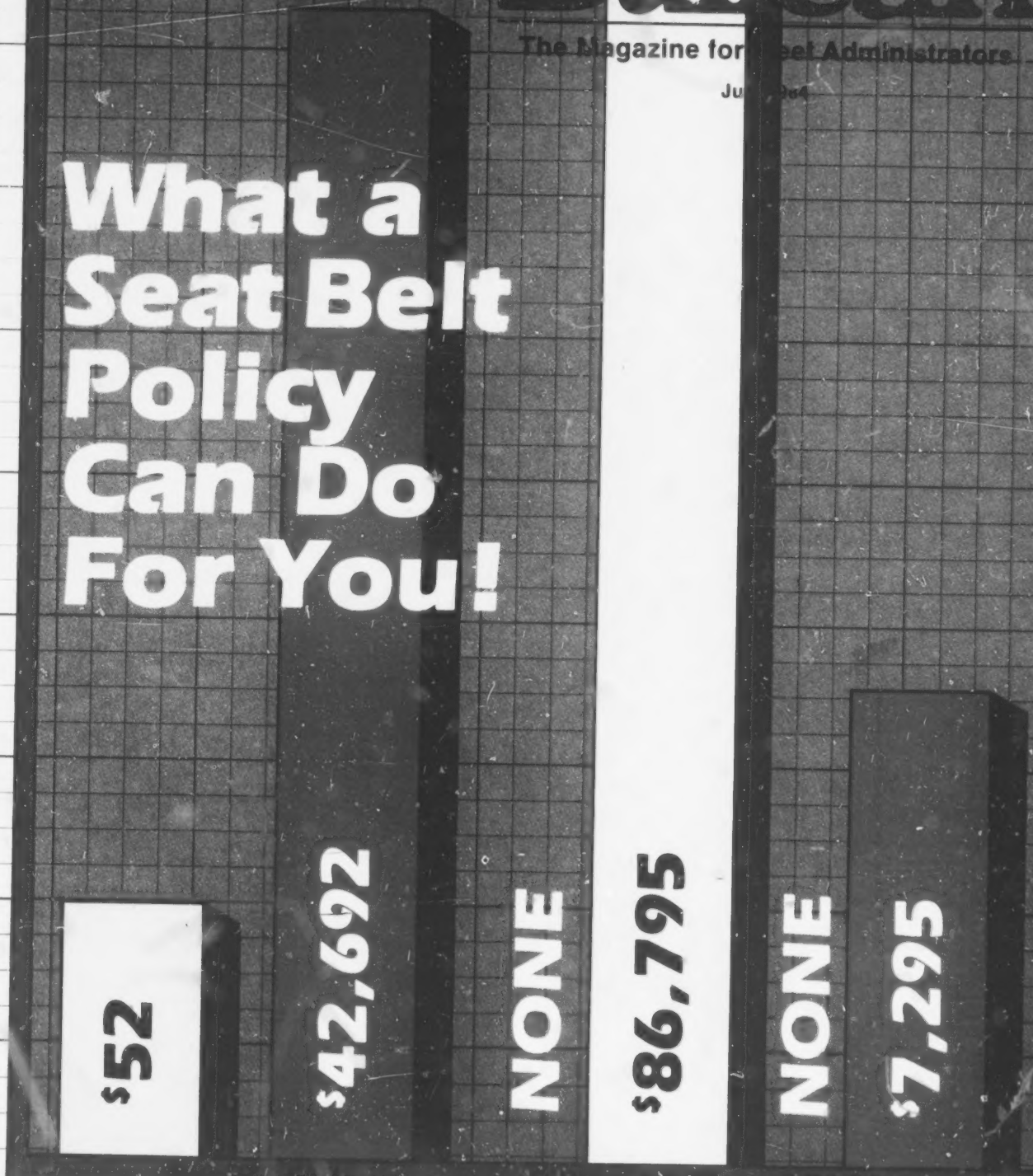
NAFA Bulletin

The Magazine for Fleet Administrators

July 1984

What a Seat Belt Policy Can Do For You!



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New Safety Feature:

"Third Eye" Auto Taillight on Rear Deck Reduces Rear-End Collisions by 50 Percent

Ready world? A third auto taillight is about to make its debut — with good reason. The following article, reprinted with permission by the Alliance of American Insurers and published in their "Journal of American Insurance," Vol. 59, No. 4, 1983-1984, describes why a third auto taillight will soon be required equipment on every car.

IF YOU'VE EVER had the heart-stopping experience of coming to a sudden halt on a busy expressway at rush-hour, you might welcome the addition of a third, high-mounted taillight on every car in that crowd. Now you can relax — a new federal regulation was recently enacted which will require automakers to put a "third eye" high on the rear deck of all passenger vehicles manufactured after September 1, 1985.

For nearly 20 years, the government, the insurance industry and the automobile industry have been studying the role of taillights in rear-end automobile collisions. Time and tests finally produced conclusive evidence that a third, high-mounted taillight on autos, trucks and vans is effective in reducing rear-end collisions by as much as 50 percent.

Though logic dictates that a third taillight would reduce rear-end collisions, federal regulations should be supported by solid, empirical evidence. So, about 1978, the National Highway Traffic Safety Administration (NHTSA), a division of the U.S. Department of Transportation, got serious about supporting its logical assumption regarding the "third eye" and commissioned an outside agency to test the hypothesis. Three separate studies were eventually conducted to prove unequivocally that the "third eye" can significantly reduce human and economic losses caused by rear-end collisions.

Taxi Cabs Tested

Researchers at the Essex Corporation in Alexandria, Virginia, began testing three different rear lighting configurations on approximately 2,100 taxi cabs (four groups of 525 each) in the Washington, D.C., area. Group number one bore a single, high-mounted center brake light at the approximate eye level of a following driver. In addition, the cab carried conventional brake lights. The center lights were placed on trunks just beneath the centerlines of the cabs' rear windows. For this group, the extra center light served no other function than to indicate that the cab was braking.

Test group number two featured two high-mounted stoplights, one on each side of the trunk directly below the rear window, again at the approximate eye level of the following driver. These stoplights also functioned separately from the vehicles' normal stop and turn signal lamps.

Group number three carried separate tail and signal lights. Set in pairs, these taillights were in conventional positions but their functions were separated so that one pair of lamps lit with the headlights while a second set responded to brakes and turn signal switches. The fourth group (the control group) retained conventional rear lighting systems. Stopping, turning and tail illumination were signaled by the same set of lights positioned low on the vehicle.

12 Month Study

All four groups were studied for 12 months, during which the cabs traveled a total of nearly 60 million vehicle miles under a variety of weather and road conditions. The Essex Corporation was careful to match drivers in equal groups by age, sex and prior accident records.

During the study period, the four groups logged a total of 1,470 accidents, of which 217 (or 15 percent) were "relevant" rear-end collisions. Used here, the term "relevant" refers to colli-

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Third Auto Taillight

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sions in which a stop lamp could have affected the outcome. Rear-end collisions involving parked cars were excluded.

Test Results

Results were measured and carefully evaluated both in terms of accidents per million vehicle miles. The Essex Corporation found that the cabs in Group One — those equipped with a rear stoplight mounted high in the center of the vehicle — had fewer than half the rear-end collisions experienced by the control group. Relevant rear-end collisions in the first test group occurred 54 percent less frequently than in the others.

In addition, damages caused by rear-end collisions in group number one were the least costly to repair of all rear-end collisions in the test fleet. These cars, then, not only had fewer rear-end collisions, but when they were hit from behind, following cars were already slowing down, causing less damage. The effectiveness of the signal, high-mounted stoplight increased at night and in situations where it was more certain that brakes were applied before or at the time of impact.

Further Findings

Further findings in the Essex study were that the rear-end collision rates of the other two experimental groups were almost as bad as those of the control group, ruling out the potential for crash reductions from dual-mounted pairs with separated functions. Naturally, the Essex Corporation reported that single, center, high-mounted stop signals have the potential to "dramatically reduce the occurrence of rear-end collisions on a national scale." But Essex Corporation's findings were not considered conclusive.

Since all the vehicles in the Essex experiment were similar (D.C. cabbies chosen drove Dodges and Plymouths of similar models), and all were driven by experienced taxi drivers in an urban area, results could not be applied responsibly to all drivers in the United States. Essex researchers recommended that a second experiment be conducted to validate their findings. They suggested the second experiment duplicate the three types of taillights tested in Washington on cars other than taxi cabs in driving conditions outside the city. In addition, Essex researchers recommended that, based on their findings and validation from a second research group, NHTSA should propose a federal rule requiring that the single high-mounted taillight be placed on all new vehicles.

To verify Essex findings, NHTSA hired the Allen Corporation, also of Alexandria, Virginia, to conduct an expanded test. Allen researchers broadened the test field to include 5,400 telephone company passenger vehicles. Half of the cars were equipped with center high-mounted brake lights. The other half, used as a control group, were operated with conventional rear lighting systems — two low-mounted stop, turn and taillights.

This time test vehicles were of a variety of different makes and models and drivers varied in their experience. Test cars were driven in 15 different states. The Allen Corporation's study was not confined to urban driving, but included travel in and around mid-sized communities.

In a single year, over an

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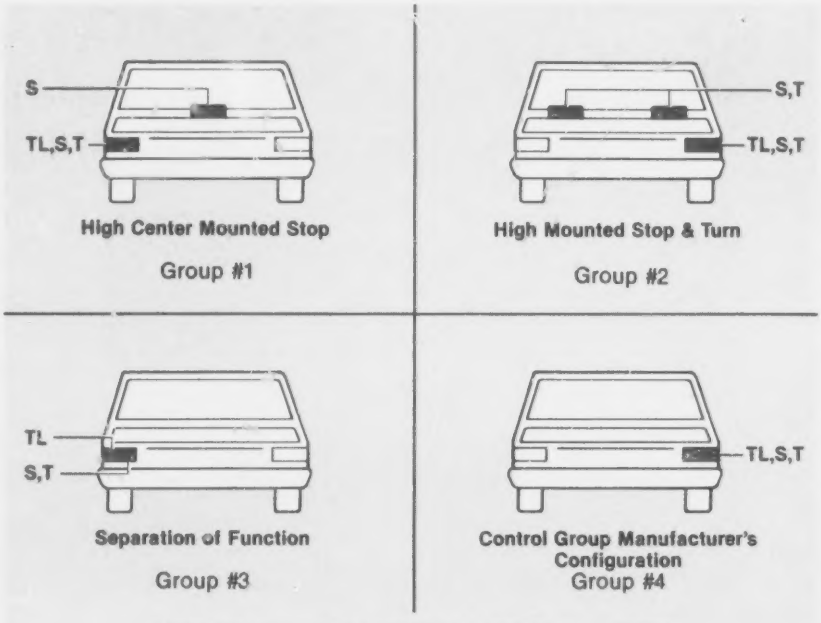
Figure 1. Tail Lamp Configurations Used in Studies of Four Taxi Groups, Washington, D.C.



"Time and tests finally produced conclusive evidence that a third, high-mounted taillight is effective in reducing rear-end collisions by as much as 50 percent."

Third Auto Taillight

(Continued from page 20)

accumulated total of about 55 million vehicle miles, the test group experienced 53 percent fewer rear-end collisions than did the conventionally equipped cars. Allen Corporation findings were in remarkably close agreement with Essex research and went on to explain the possible reasons for the "third eye's" success.

Allen researchers felt that the center stoplight worked because it was placed at the approximate eye level of a following driver. Taken one step further, then, the new brake light could usually reach back two cars because it is visible through the window of a car between the lead vehicle and a third.

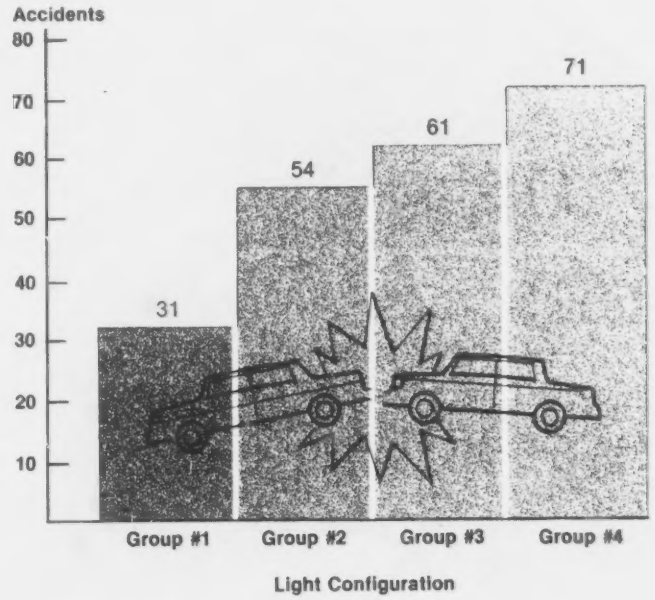
Because the auxiliary stop light serves only one purpose, suggested Allen researchers, its message is perceived more quickly by a following driver. On the other hand, standard equipment not only signals a stop, but also indicates an automobile's presence at night and its turning intentions. This ambiguity can conceivably dull driver response to the braking signal.

In addition, Allen researchers suggested that the position of the auxiliary stop light creates a sort of triangle when combined with standard brake lights and that "visual geometry" improves the speed, frequency and distance with which a following driver detects, then mentally registers, the lead vehicle's intentions. And, it could be that the auxiliary stop light was successful in reducing rear-end collisions simply because of its novelty.

Questions Raised on Effectiveness

The questions of success due to novelty and of the stop light's effectiveness in rural driving situations were raised by members of the auto industry when Allen Corporation's results were published in 1980. NHTSA addressed both those questions and other criticisms.

Figure 2. Number of Rear End Accidents Each Taillight Group
(525 Taxicabs per Group, Essex Corp. Study)



Source: Essex Corp.

One skepticism voiced surrounded the effectiveness of the center high-mounted stop light on subcompact cars. Both Essex and Allen test vehicles were mid-sized to large, raising the question that subcompacts might be involved in fewer rear-end accidents in which a stop light could have affected the outcome.

To dispel that doubt, NHTSA officials studied police-reported accidents involving passenger cars struck from the rear in North Carolina collisions, 1975 through 1980. Information collected by car size showed no statistically significant differences in relevant rear-end accident rates among intermediate, compact and subcompact domestic cars. Data did show that, for some undetermined reason, subcompacts were struck more frequently in the rear during 1976 than were intermediate and compact models. Nonetheless, the North Carolina results were accepted as comparable to nationwide accident experience.

Others suggested the "third eye" would not change accident experience for subcompacts because conventional taillights were already closer together on diminutive models than on larger cars. Again, NHTSA refuted the question, indicating the extra brightness and higher placement of the third light along with the braking-only function, would effect small cars in the same way as larger models.

"The position of the auxiliary stop light creates a triangle when combined with standard brake lights... improving speed, frequency and distance with which a following driver detects, then mentally registers the lead vehicle's intentions."

Automakers objected to the design restriction of a single, center-mounted stop light. However, in the Essex tests the dual-lamp configuration performed much less effectively than did the center-mounted lamp, probably because of its triangular shape and centerline and eye-level location.

Dissenters argue that once all cars bear the high-mounted stoplight, drivers will become desensitized to its message. No test can accurately predict whether drivers will stop noticing high-mounted stoplights, but NHTSA says the new light provides an additional, more prominent cue to drivers on the centerline of their vision. The third light can be detected at least two vehicles back and the signal means only one thing — "Stop." It's even likely, says NHTSA, that the positive effects of the "third eye" will increase as more cars carry it.

"NHTSA says the new light provides an additional, more prominent cue to drivers on the centerline of their vision... it can be detected at least two vehicles back and the signal means only one thing — 'Stop.'"

With all this empirical evidence compiled, still another study was conducted for good measure. The Insurance Institute for Highway Safety (IIHS) repeated the experiment among New York taxi drivers. This time, the intensity of taillight bulbs was tested. IIHS researchers reported that brighter lamps were more effective in reducing rear-end collisions. So, the federal rule stipulates lamp capacity and bulb intensity.

Cost of Light Bulb?

What is the cost of this controversial light bulb? Auto manufacturers estimate their cost to install the "third eye" on 1986 model passenger cars, vans, trucks and buses will average $8 to $15 more per vehicle. NHTSA estimates the ultimate consumer cost will range from $4 for integration of the lamp into new vehicle designs to about $7 for adding it to existing vehicle designs. The initial annual consumer cost, starting with 1986 model cars, is estimated at approximately $70 million, based on an annual production of 10 million passenger cars. Later costs are estimated to average $4 per car.

But, what can be saved with the "third eye?" NHTSA estimates indicate there would have been 900,000 fewer accidents and 40,000 fewer injuries had **all** passenger cars been equipped with the center, high-mounted stop light in 1980. National records show that four million cars are rear-ended every year. Data indicating fatalities resulting from "relevant" rear-end collisions is not available, but it is certain that deaths occur in a portion of these accidents.

"Studies indicate that average repair costs for test cars involved in rear-end collisions were lower for those with center-mounted "third eyes."

Both the Essex and the Allen studies indicated that average repair costs for test cars involved in rear-end collisions were lower for those with center-mounted "third eyes." The 50 percent reduction in the number of accidents produces an additional savings. NHTSA estimates that nearly $434 million in auto repairs would have been saved in 1980 alone had all cars been equipped with the "third eye."

When the costs of installation are subtracted from the potential economic losses resulting from rear-end collisions, the minimum net benefit, if the stop light retains its 50 percent effectiveness, would be $284 million in a single year (1982 dollars).

Future of Auto Safety

The National Highway Traffic Safety Administration, Insurance Institute for Highway Safety and other august research organizations are constantly studying new highway safety measures. Barry Felrice, of the NHTSA, speculated on the future of auto safety. "It's conceivable," he said, "that cars will eventually drive themselves. As much as 15 years ago in engineering schools we were talking about automated highways where cars coast along, undisturbed, three inches apart. Radar brakes that detect and respond to obstructions automatically have already been developed and tested. Drivers may use such brakes by the end of this decade."

NHTSA engineer Kevin Cavey speculates further. "By the year 2000," he suggests, "you may be able to program your car's destination, get in and ride there as safely as you now do on a train. The technology for automated cars exists. When people accept these new ideas, the auto industry will pay the expense of marketing and manufacturing them."

A number of drivers have already accepted the idea of third taillights. More and more "third eyes" are looking back at American drivers. Do-it-yourselfers can obtain kits for installing additional brake lights. For those disinclined to "do-it-themselves," most service station mechanics can be induced to perform the simple operation. It's just one more step to prevent the kind of "bang up time" you can do without. ■